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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,524	04/15/2002	Michael John Carey	348-028	5918

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EXAMINER

WOZNIAK, JAMES S

ART UNIT	PAPER NUMBER
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2626

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/030,524	Applicant(s) CAREY ET AL.	
	Examiner James S. Wozniak	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 32-35, 42-52 and 59-65 is/are rejected.
- 7) ☒ Claim(s) 36-41 and 53-58 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text.

Claim Objections

2. **Claims 41 and 58** are objected to because of the following informalities:

The equations recited in claims 41 and 58 have a smaller type font, making reading the equations difficult. A font similar to that used in the rest of the claim limitations should be used for these equations in order to make them readable.

The following variables have not been defined in claims 41 and 48: $Y(k)$, $R''(k)$, and $L''(k)$. These variables should be defined in the claims in order to clarify their meaning within the claimed transfer function equations.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 32, 47-49, and 61-63** are rejected under 35 U.S.C. 102(b) as being anticipated by Shozakai et al ("*Robust Speech Recognition in Car Environments*," 1998).

With respect to **Claims 32, 49, and 63**, Shozakai discloses:

Apparatus and method for cancellation of one or more non-stationary interfering signals for speech recognition (*speech recognition system capable of canceling non-stationary noise in a car cabin environment*, Page 269, Section 1; Table 1), comprising:

Means for receiving an acoustic signal (microphone, Fig. 1a);

Means for generating an estimated value of a magnitude spectrum of said non-stationary interfering signals (estimation of an additive noise spectrum, Pages 270-271, Section 2.3); and

Means for subtracting the estimated value from the received acoustic signal to produce a representation of a wanted speech magnitude spectrum (*performing continuous cepstral subtraction to suppress noise in speech for a speech recognition process*, Pages 270-271, Section 2.3; Page 272, Sections 3-4; and Abstract, Page 269).

With respect to **Claim 47**, Shozakai discloses:

The non-stationary interfering signals are produced by an electronic acoustic device operating in a vehicle (*non-stationary noise produced by a stereo or navigation system within a car environment, Page 269, Abstract; Section 1; and Table 1*).

With respect to **Claim 48**, Shozakai recites:

The means for receiving an acoustic signal comprises a microphone (*microphone input, Fig. 1a*).

With respect to **Claim 61**, Shozakai discloses:

A speech recognition system including the apparatus according to claim 32 (*noise canceller in a automobile speech recognition system, Page 269, Abstract and Section 1*).

With respect to **Claim 62**, Shozakai discloses:

An electronic acoustic device including the apparatus according to claim 32 (*speech recognizer utilizing non-stationary noise cancellation implemented in a navigation system, car stereo, or cellular phone, Page 269, Section 1*).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 33-35, 44-46, 50-52, 60, and 64-65** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shozakai et al in view of Minami et al (*U.S. Patent: 5,555,310*).

With respect to **Claims 33, 50, and 64**, Shozakai teaches the non-stationary noise cancellation system and method capable of generating an estimated noise spectrum, as applied to claims 32, 49, and 63. Shozakai does not teach generating a transfer function for an acoustic channel between each source of the non-stationary interfering signal and the means for receiving an acoustic signal, however Minami discloses a means for calculating a transfer function for acoustic channels between left and right loudspeakers and a microphone in an echo cancellation process (*Col. 13, Line 39- Col. 14, Col. 2; Col. 16, Line 24- Col. 19, Line 37*).

Shozakai and Minami are analogous art because they are from a similar field of endeavor in noise cancellation systems. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Shozakai with the echo canceller featuring a transfer function calculation means as taught by Minami in order to implement low cost echo cancellation capable of canceling acoustic echoes from a plurality of paths (*Minami, Col. 3, Lines 60-62*).

With respect to **Claims 34, 51, and 65**, Minami further recites:

The processing means is configured to estimate transfer functions for said non-stationary interfering signals produced by left and right stereo channel transmissions (*determining transfer functions for left and right loudspeakers, Col. 16, Line 24- Col. 19, Line 37*).

With respect to **Claims 35 and 52**, Shozakai further discloses continuous non-stationary additive noise processing that is performed each frame (*Pages 270-270, Section 2.3*).

With respect to **Claims 44-45 and 60**, Shozakai further discloses spectrum smoothing utilizing a FIR filter (*Page 270, Section 2.2*).

With respect to **Claim 46**, Shozakai discloses:

A means for performing a Fourier Transform (*determining a speech spectrum in a frequency domain from an input speech signal in the time domain which would inherently require some type of Fourier transformation, Pages 269-270, Section 2.1; and Fig. 1a*).

7. **Claims 42-43 and 59** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shozakai et al in view of Minami et al, and yet further in view of Heitkämper ("*An Adaptation Control for Acoustic Echo Cancellers*," 1997).

With respect to **Claims 42-43 and 59**, Shozakai in view of Minami teaches the non-stationary noise cancellation system and method capable of estimating a noise spectrum and transfer functions for left and right stereo channels, as applied to Claims 32 and 49. Shozakai in view of Minami do not specifically suggest a means for smoothing in the time domain comprising a first order recursive filter, however Heitkämper discloses a means for averaging (smoothing) in the time domain using a first order recursive filter for detecting a far-end speech signal (*Pages 170-171, Section 1A*).

Shozakai, Minami, and Heitkämper are analogous art because they are from a similar field of endeavor in noise cancellation systems. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Shozakai in view of Minami with the first order recursive filter means taught by Heitkämper in order to implement adaptive echo (interfering signal) control based on a speaker's activity (*Heitkämper, Page 170, Abstract*).

Allowable Subject Matter

8. **Claims 36-41 and 53-58** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 36 and 53**, the prior art of record fails to explicitly teach or fairly suggest a noise cancellation apparatus and method utilized with a speech recognizer in an automobile environment that subtracts an estimated non-stationary noise magnitude spectrum to produce a desired speech spectrum for speech recognition, having a processing means and step that estimates a transfer function between left and right stereo channels and a microphone input and magnitudes of the channels, wherein the magnitude of the left channel interference is estimated by subtracting the right channel interference signal magnitude estimated during the previous transfer function iteration from an acoustic signal of a current iteration and the magnitude of the right channel interference is estimated by subtracting the left channel interference signal magnitude estimated during the previous transfer function iteration from an acoustic signal of a current iteration.

Although Minami et al (*U.S. Patent: 5,555,3140*) teaches calculating a difference between right and left stereo channels (*Col. 10, Line 29- Col. 11, Line 3*), the difference taught by Minami is related to a delay and not the calculation of an interference signal magnitude. Also, Minami fails to teach that the difference calculation is related to interference signal

cancellation and that the difference is calculated between the past interferences from right and left channels and an acoustic signal of a current iteration.

Thus, Claims 36 and 53 contain allowable subject matter.

Claims 37-40 and 54-57 further limit claims containing allowable subject matter, and thus, also contain allowable subject matter.

With respect to **Claims 41 and 58**, the prior art of record fails to explicitly teach or fairly suggest a noise cancellation apparatus and method utilized with a speech recognizer in an automobile environment that subtracts an estimated non-stationary noise magnitude spectrum to produce a desired speech spectrum for speech recognition, having a processing means and step that estimates a transfer function between left and right stereo channels and a microphone input, wherein the transfer function estimates are calculated according to the equations of claims 41 and 58.

Although Minami et al (*U.S. Patent: 5,555,3140*) teaches discloses a means for calculating a transfer function for acoustic channels between left and right loudspeakers and a microphone in an echo cancellation process (*Col. 13, Line 39- Col. 14, Col. 2; Col. 16, Line 24- Col. 19, Line 37*), Minami does not utilize the equations of claims 41 and 58 to perform such a calculation.

Thus, Claims 41 and 58 contain allowable subject matter.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Sylvain et al (*U.S. Patent: 4,782,525*)- teaches left and right channel echo cancellers.

Tsurufuji et al (*U.S. Patent: 6,411,928*)- teaches a speech recognition system capable of canceling interfering signal from left and right speakers.

Finn et al (*U.S. Patent: 6,505,057*)- teaches a system for canceling echoes form multiple audio sources.


Benesty et al (*"A Better Understanding and an Improved Solution to the Specific Problems of Stereophonic Acoustic Echo Cancellation," 1998*)- teaches an echo cancellation system for stereophonic audio.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached at (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
4/10/2006



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